SECTION 850.00 - RAIL HIGHWAY GRADE CROSSINGS

SECTION 851.00 - INTRODUCTION

851.01 General. A railroad grade crossing is, in effect, a traffic crossing and due consideration must be given to the design of traffic control devices and surface improvement.

851.02 Minute Entries: Stop Signs. The Idaho Code, Section 49-202(25) requires the placement of stop signs at all railroad grade crossings where electronic or mechanical warning signals do not exist. However, when there is a determination that the existence of stop signs at a given crossing would constitute a greater hazard than their absence, the mandatory placement is waived. A Minute Entry must be made by the Traffic Engineer on those crossings on state highways where stop signs are not used. Local jurisdictions should be cautioned that they need to either place stop signs or have an evaluation and resolution or minute entry for not signing.

On state highways, a new or revised railroad grade crossing shall be reviewed by Headquarters Traffic. Recommendations will be sent to the District Traffic Engineer for or against the installation of stop sign controls. Headquarters Traffic will prepare a minute entry if the determination that stop signs at a given railroad grade crossing is not recommended. Headquarters Traffic should be notified immediately about revisions to crossing protection for updating the Minute Entry.

851.03 Minute Entries: Exempt Signs. The Idaho Code, Section 49-649, and Article 392.10 of the Federal Motor Carrier Safety Regulations, requires that certain vehicles stop at every railroad grade crossing. Some minimum use crossings which have positive control such as flagman and/or stop signs for trains can qualify as an "Exempt" crossing.

If an Exempt crossing is planned, Headquarters Traffic will prepare a study report giving the details of location, use, and warning devices. Hold a meeting with the railroad company or obtain a letter from them with their recommendations for operation and control. Forward these to the District Traffic Engineer for information and to prepare a minute entry. If approved, railroad crossing "Exempt" signs will be installed.

851.04 Railroad Crossing Inventory. Headquarters Traffic is responsible for monitoring the state's portion of the National Railroad Crossing Inventory. Work performed at state highway railroad grade crossings involving alterations or improvements of current safety devices or roadway geometrics will be reported to the Headquarters Traffic Section by the Districts.

After receipt of the updated information, the Headquarters Traffic Section will initiate an update to the National Railroad Crossing Inventory using published guidelines.

SECTION 852.00 - DIAGNOSTIC TEAM

852.01 General. When a crossing is being considered for improvement, the District Traffic Section or Local Roads Section will set up a meeting of a diagnostic study team. This team will bring together representatives of various agencies involved and immediately establishes lines of communication so that ultimately a functional method of crossing protection may be provided.

852.02 Team Composition. In the diagnostic team approach, use is made of experienced individuals from various agencies and disciplines. These individuals review the site of the railroad grade crossing and collectively identify safety hazards and develop countermeasures.

To date, the most successful diagnostic team studies have involved professional people from the railroads, highways and the cities or counties representing the disciplines of administration, design, operations, maintenance and law enforcement. To ensure appropriate representation, the following team members are suggested:

- ITD traffic engineer with highway safety experience
- ITD employee that represents the involved district
- Railroad signal engineer
- Railroad administrative official(s)
- City, county and/or highway district official(s)
- Law enforcement officer
- FHWA personnel
- Idaho Public Utilities Commission representative
- ITD Rail/Highway Safety Coordinator

852.03 Data Collection. An on-site inspection of the crossing should be arranged by the District Traffic Engineer or Local Roads Engineer. The District Traffic Engineer or Local Roads Engineer will act as secretary for the team. The Rail Highway Crossing Forms (available from Headquarters Traffic) should be completed before and during the on-site review. All information that can be gathered ahead of the on-site inspection should be available to the review team.

852.04 Decision. The goal of the field review is for the team to decide if protection is warranted, what type of protection should be used and establish standards for design. The decisions recorded are binding and can be changed only by letter from the Chief Engineer to all members of the diagnostic team stating the reasons for such change.

SECTION 853.00 - RAILROAD CROSSING TRAFFIC CONTROL DEVICES

853.01 General. The function of traffic control devices is to permit safe efficient operation of railroad and highway traffic. These include both passive and active devices. The passive devices include all signs, pavement markings and illumination. Active devices are flashing light signals, gates, bells and other train activated devices.

It should be noted that the MUTCD says "SHALL be installed" on advance warning signs, and some pavement markings. The state, local government, or railroad company must install and maintain these or be vulnerable to tort action.

853.02 Passive Control Devices. Passive devices are all those that do not give active warning of the approach or presence of a train, locomotive or cars on the crossing. That is, their message is always displayed. National standards for the use of all passive devices are set forth in the Manual on Uniform Traffic Control Devices (MUTCD-Part VII).

The following passive control devices will be installed at public railroad crossings:

- Crossbuck signs - The railroad company is responsible for the placement and maintenance of these signs. One reflectorized sign is required on each approach to the railroad grade crossing. (MUTCD: 8B-2)

- Number of Track Signs - The railroad company is responsible for the placement and maintenance of the inverted T-shaped signs that are mounted below the crossbuck signs to indicate the number of tracks when two or more tracks are between crossbucks. These signs are optional at railroad crossings protected by automatic gates. (MUTCD: 8B-2)

- Exempt Signs - The state or local jurisdiction is responsible for the placement and maintenance of these signs if an engineering study indicates that exempt signs are to be installed. Criteria in the Federal Motor Carrier Safety Regulations, Title 49, Section 392.10 are to be met and a Minute Entry made before the signs are installed. (MUTCD: 8B-6) See section 851.03.

- Railroad Advance Warning Signs - The state or local jurisdiction is responsible for the placement and maintenance of these signs on each approach to the railroad grade crossing except:

    - Low volume, low speed roadways crossing minor spurs.

    - Other tracks which are infrequently used and which are flagged by train crews.

    - Business districts of large cities where active grade crossing traffic control devices are in use.

    - Where physical conditions do not permit even a partially effective display of the signs (MUTCD: 8B-3).

- Stop Signs - The state or local jurisdiction is responsible for the placement and maintenance of these signs on each approach to railroad crossings except:

    - Crossings where active traffic control devices are installed.

    - Crossings where an engineering study indicates that stopping is more hazardous and a Minute Entry has been made to exempt the stop sign [MUTCD: 8B-9 and Idaho Code 49-202(25)].

- Pavement Markings - The state or local jurisdiction is responsible for placement and maintenance of pavement markings on all railroad grade crossings where the roadway is paved and automatic gates are located and all other crossings where the prevailing speed of the roadway is 40 MPH or higher. (MUTCD: 8B-4)

- Illumination - The state or local jurisdiction is responsible for the placement and maintenance of lighting at or adjacent to railroad grade crossings. Lighting should be installed at railroad grade crossings that have no active traffic control devices and have an accident history that indicates a problem during the hours of darkness. (MUTCD: 8B-5)

853.03 Active Control Devices. Active railroad grade crossing traffic control devices include post mounted flashing light signals, cantilever mounted flashing light signals, gates, bells and other devices or methods that inform motorists and pedestrians of the approach or presence of a train, locomotive or railroad cars on the crossing.

853.03.01 Post-Mounted Flashing Signals. The following guidelines are for evaluating the need for installing post-mounted flashing light signals at railroad grade crossings:Accident history of one or more accidents in the past five years.

- Sight restriction in one or more quadrants.

	Rural	Urban
• Vehicular Traffic Volume	Medium	Medium
Train Traffic Volume	Medium	Medium
Vehicular Speed	Medium	Medium
Train Speed	High	Medium

- The closure of another crossing if active protection is installed.
- Substantial number of school bus crossings.
- Substantial number of vehicles carrying hazardous materials.
- A diagnostic team determines post mounted flashing lights are required.

853.03.02 Cantilever Flashing Signals. Install cantilever-mounted flashing light signals to supplement post-mounted flashing light signals under one or more of the following conditions:

- There are distractions near or beyond the crossing which would compete for the driver's attention and especially where there are other light sources (advertising, etc.) beyond the crossing.
- Traffic or parking conditions are such that the view of a post mounted flashing light signal could be blocked.
- All multilane highways, so the flashing light signals will be visible to drivers in all approaching traffic lanes.
- A diagnostic team determines cantilever mounted flashing light signals are required.

853.03.03 Automatic Gates. Install automatic gates to supplement flashing light signals under the following conditions:

- All crossings with multiple main line tracks
- All multiple track crossings which may have more than one train or locomotive occupying the crossing at one time.
- All railroad crossings with high speed passenger trains combined with medium to high vehicular speeds and volumes.
- A diagnostic team determines automatic gates are required.

853.03.04 Bells. Bells, the audible signal, are a carryover from days of open vehicles wherein the drivers could easily hear the sounding of the approaching train. Bells should be installed to supplement flashing light signals as follows:

- All urban crossings with other active protection.
- A diagnostic team determines that bells are required.

853.04 Table of Relative Measures

VEHICULAR TRAFFIC VOLUMES (AADT)

	Rural	**Urban**
Low:	0-750	0-2,500
Medium:	751-3,000	2,501-5,000
High:	Greater than 3,000	Greater than 5,000

VEHICULAR TRAFFIC SPEEDS (MPH)

	Rural	**Urban**
Low:	0-20	0-15
Medium:	21-40	16-34
High:	Greater than 40	Greater than 34

TRAIN TRAFFIC VOLUMES (T/D)

	Rural	**Urban**
Low:	0-2	0- 6
Medium:	3-9	7-12
High:	Greater than 9	Greater than 12

TRAIN TRAFFIC SPEEDS (MPH)

	Rural	**Urban**
Low:	0-35	0-15
Medium:	36-90	16-35
High:	Greater than 90	Greater than 35

SECTION 854.00 - ROADWAY GEOMETRICS

854.01 General. Idaho Code Section 49-649, does not require specific vehicles to stop at rail-highway grade crossings that are protected by police officers, flagmen, traffic control signals, railroad crossing gates or alternating lights, and those signed as "exempt." However, the Federal Motor Carrier Safety Regulations requires certain vehicles to stop even at train actuated signalized railroad grade crossings.

854.02 Truck Stopping Lanes. Generally, truck stopping lanes are not provided at locations with active protection. A decision should be made on a project-by-project basis on those crossings with only passive control.

854.03 Crossing Surface. Each crossing surface should be compatible with highway user requirements and with railroad operations at the site. For example, highways having a large ADT moving at high speeds merit smoother crossing surfaces of a type requiring infrequent maintenance. A track carrying frequent high speed train movements should have one of the sectional or modular panel types which can be easily removed and replaced.

Fortunately, a rather wide variety of crossing surface types are available from which choices may be made to best suit requirements of individual crossing locations. The selection of the type of crossing surface to be used should be made after consultation between representatives of the railroad and highway agency involved.

SECTION 855.00 – FEDERAL RAIL HIGHWAY SAFETY PROGRAM

855.01 General. The purpose of this program is to improve safety at rail-highway crossings using Federal Aid Funding. This is to be done through selection, design, scheduling, construction and making necessary final adjustments to the projects. The Rail-Highway Safety Program consists of three components to accomplish these goals: Planning, Implementation and Evaluation.

855.02 Planning Component. The purpose of the planning component is to identify existing and/or potential rail-highway safety problems and establish priorities for implementing safety improvement projects. The four processes within the planning component are:

I. Collect and Maintain Data
II. Identify Hazardous Rail-Highway Crossings
III. Establish Project Priorities
IV. Conduct Engineering Studies

855.02.01 Process I – Collect and Maintain Data. The purpose of this process is to collect the necessary data for rail-highway crossings.
Two sub-processes have been defined within this process as follows:

1. Collect and Maintain Collision Data
2. Collect and Maintain Crossing Data

Sub-Process 1 – Collect and Maintain Collision Data

The purpose of this sub-process is to collect, sort and process collision data collected from railroad companies, Federal Railroad Administration (FRA) and Idaho Vehicle Collision Reports for use in identification and subsequent analysis of rail-highway crossings.

Individual collisions are reported on the "Idaho Vehicle Collision Report" form. By Idaho Code, a reportable traffic collision is one that results in death, injury or damage to property in excess of $750. In addition to the Idaho Vehicle Collision Report, the railroad companies report rail-highway collisions to the FRA and the Idaho Transportation Department. Headquarters Traffic shall maintain a single database containing information from all of these reports.

Sub-Process 2 – Collect and Maintain Crossing Data

The purpose of this sub-process is to collect and maintain location related data needed for use in the identification of hazardous rail-highway crossings. Headquarters Traffic shall maintain this data in the Rail-Highway Crossing Database.

855.02.02 Process II – Identify Hazardous Rail Highway Crossings. The initial prediction of crossing collisions is determined from the basic collision prediction formula described in "Rail-Highway Crossing Resource Allocation Procedure, User's Guide, Latest Edition" published by the Federal Railroad Administration.

Initial Collision Prediction Formula

The general expression of the basic formula is shown below:

$$a = K \times EI \times DT \times MS \times MT \times HP \times HL \times HT$$

Where:

a = initial collision prediction (collisions per year)

K = constant for initialization of factor values at 1.00

EI = factor for exposure index based on product of highway and train traffic

DT = factor for number of through trains per day during daylight

MS = factor for maximum timetable speed

MT = factor for number of main tracks

HP = factor for highway paved

HL = factor for number of highway lanes

HT = factor for highway type (Functional Classification)

The value of each of these factors shall be determined based upon existing warning devices. The three categories are as follows:

1. Passive, including the following warning devices:
   a) No signs or signals present
   b) Stop signs
   c) Crossbucks
   d) Other signs

2. Active, including the following warning devices:
   a) Special devices i.e., Flagman
   b) Interconnected highway signals, wig-wags, or bells
   c) Cantilever and/or mast mounted flashing lights

3. Gates, including automatic gates with cantilever and/or mast mounted flashing lights.

Secondary Collision Prediction Formula

The secondary prediction equation uses the actual observed collision history at the crossing. This prediction assumes that the projected fatal collision rate will be the same as the average historical rate. The prediction formula is expressed as follows:

$$A = (a + 0.05N + aN) / (1 + 0.05T + aT)$$

Where:

A = secondary collision prediction, collisions per year

a = initial collision prediction from basic formula

N = number of observed collisions during study period

T = length of study period (5 years)

Final Collision Prediction Formula

The final prediction equation uses the results of the secondary prediction equation multiplied by a constant. The constant is selected based upon the type of existing warning device and is updated by FRA every two years based on national statistics.

855.02.03 Process III – Establish Project Priorities. The purpose of this process is to establish a priority list of projects developed in Process II.

Headquarters Traffic shall distribute the priority index of rail-highway crossings in January of each year for internal use only. This list includes all rail-highway crossings in the State of Idaho. The priority index is based on the collision potential that was calculated using the final prediction formula in Process II.

The crossings are then ranked from high to low by collision potential. All crossings with a potential of one or more collisions in the next ten years will be considered. This list is then transmitted to Highway Programming for inclusion in the update package.

Crossings that are being considered for track circuit or other upgrades will have their priority index calculated as if only passive warning devices were installed. If there is a potential of one or more collisions in the next ten years, the crossing will be considered for a track circuitry or other upgrade. If federal-aid is not available, funding from the "Railroad Grade Crossing Protection Account" is to be used.

855.02.04 Process IV – Conduct Engineering Studies. The purpose of this process is to conduct engineering studies based on the rail-highway crossings on the list developed in Process III, Establish Project Priorities, and then recommend appropriate safety countermeasures. Private crossings and grade-separated crossings are not considered in this program.

An engineering review shall be conducted at all crossings being considered for safety improvements. The engineering reviews shall be conducted as outlined in Section 852.00 of the Traffic Manual. A design, construction and maintenance agreement is required between the Idaho Transportation Department and the local road jurisdiction if it is determined that safety improvements are needed at the crossing.

855.03 Implementation Component. The purpose of this implementation component is to design, schedule, construct and make necessary final adjustments to the projects, which were selected in the Planning Component.

The Implementation Component consists of one process which is designated as Process I – Schedule and Implement Rail-Highway Improvement Project.

855.03.01 Process I – Schedule and Implement Rail Highway Improvement Project. The purpose of this sub-process is to schedule and design the rail-highway safety improvement projects to insure the most efficient use of time and resources.

The two sub-processes under this process are:

1. Schedule Projects
2. Design and Construct Projects

Sub-Process 1 – Schedule Projects

Project scheduling involves determining when each improvement can be started and completed under real-world constraints. Headquarters Traffic and district staff will work together in selecting, programming and scheduling rail-highway safety projects and should observe the following seven goals:

1. Improve the safety on State and local highway systems to prevent collisions, transport people and goods efficiently and effectively, and conserve energy.
2. Effectively invest available funds in preservation of the present highway system.
3. Balance the highway development program with projected available funds.
4. Select statewide, high priority projects for programming and use the balance of the available funds to preserve the existing system.
5. Obligate federal funds in a timely manner.
6. Develop and submit projects on schedule.
7. Provide preliminary cost estimates and updates in a timely manner.

A list of proposed projects with recommended improvements shall be presented to the Idaho Transportation Board for inclusion into the State Transportation Improvement Program.

Project priorities will not decrease after placement in the three-year Rail-Highway Safety Program. If the priority increases, changes will be made to indicate the increased priority.

Sub-Process 2 – Design and Construct Projects

The purpose of this sub-process is to design and construct all rail-highway safety projects that were selected in the Implementation Component according to the schedule developed in Sub-Process 1 – Schedule Projects.

The first year of the Rail-Highway Program is for the construction of the programmed projects.

The second year of the three-year Rail-Highway Safety Program is for the final development of plans, conducting railroad diagnostic reviews, preparation of cost estimates, and execution of the railroad agreement. The railroad companies will receive authority to purchase material in this year.

The third year of the three-year Rail-highway Safety Program is for conducting local jurisdiction field reviews and obtaining local construction and maintenance agreements.

Rail highway safety funds shall be used for the installation of active warning devices only. No safety funding will be allocated for roadway improvements or crossing surface improvements. With these restrictions, abbreviated plans will be developed by the districts in the second year of the program and be sent to the railroad companies for their use in the design of the active warning devices.

In accordance with Idaho Code 62-304a, the railroad company owning the track is required to perform all construction and maintenance of the rail-highway crossing signal equipment.

If construction is not completed within four (4) years of the project being placed on the State Transportation Improvement program, it will be removed and re-evaluated to determine the need and placement in the program.

855.04 Evaluation Component. The purpose of the evaluation component is to assess the safety benefits associated with completed rail-highway safety projects.

The evaluation component consists of one process entitled "Determine the Effectiveness of the Rail-Highway Safety Improvements."

855.04.01 Process I – Determine the Effectiveness of Rail Highway Safety Improvements. Collision based evaluations are used to evaluate the effectiveness of rail-highway safety projects. Evaluation studies measure changes in the number of collisions. This information is published annually in the "Idaho Rail-Highway Grade Crossing Collision Bulletin" published by Headquarters Traffic Section in January of each year.

SECTION 856.00 – STATE RAIL HIGHWAY SAFETY PROGRAM

856.01 General. The purpose of this program is to improve safety at rail-highway crossings using state funding. This is to be done through selection, design, scheduling, construction and making necessary final adjustments to the projects. The State Rail-Highway Safety Program consists of the same components as the Federal Rail-Highway Safety Program, Planning, Implementation and Evaluation.

856.02 Planning Component. The purpose of the planning component is to identify existing and/or potential rail-highway safety problems and establish priorities for implementing safety improvement projects.

The planning component, processes and sub-processes are the same as Section 855.02. The only change in this component is that first priority will be given to locations that need upgrades to active warning devices, and second priority will be given to locations needing upgrades from passive warning devices to active warning devices.

856.03 Implementation Component. The purpose of the implementation component is to design, schedule, construct and make necessary final adjustments to the projects which were selected in the Planning Component.

The implementation component, processes and sub-processes are the same as Section 855.03. The only change is that the railroad companies will provide the labor and equipment. The materials will be provided by the project.

856.04 Evaluation Component. The purpose of the evaluation component is to assess the safety benefits associated with completed rail-highway safety projects.

This component is the same as Section 855.04.